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Activity of essential oils against *Bacillus cereus* spores and its application to extend the shelf life of cooked rice

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Abstract

Bacillus cereus is a common foodborne pathogen associated with cooked rice. The sporicidal effects of Habbatus Sauda (HS), Lemongrass (LM), Black Pepper (BP), Oregano (OR) and Rosemary (RM) essential oils on *B. cereus* spores were investigated, along with their application in extending the shelf-life of cooked rice when stored at room temperature (30 °C). Various concentrations of each essential oil were used against *B. cereus* spore suspension, which was heated at different temperatures of 40, 70 and 100 °C for 30 min. Aside from RM, all essential oils effectively reduced > 1 log CFU/mL of *B. cereus* spores at 5% concentrations. Mixtures of rice, 5% of each essential oil of LM

and OR and *B. cereus* spore suspension were cooked together to test the efficacies of LM and OR for application to cooked rice. LM EO showed higher potential in reducing both the vegetative and spore forms of *B. cereus*. With regard to this, 5% LM essential oil was applied to cooked rice to extend its shelf-life. The rice cooked together with 5% LM EO and *B. cereus* spore suspensions were stored at 30 °C for 6 days. The result demonstrated a higher reduction of Total Viable Count (TVC), Spore-former Count (SFC) and *B. cereus* Count (BC) as compared to the control. In conclusion, essential oils of HS, LM, BP and OR were proven to have a sporicidal effect against *B. cereus* spores. LM essential oil demonstrated the capability to extend the shelf-life of cooked rice from two days to six days. © Association of Food Scientists & Technologists (India) 2025.

Author keywords

Grain; Natural antimicrobial; Spore-former bacteria; Sporicidal

Indexed keywords

Engineering controlled terms

Bacillus cereus

Engineering uncontrolled terms

Bacillus cereus spores; Black pepper; Cooked rice; ITS applications; Lemongrass essential oil; Natural-antimicrobials; Shelf life; Spore-former bacteria; Sporicidal; Sporicidal effects

Engineering main heading

Shelf life

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